CWLab

Volume 2, Issue 2

February 2005

TECHNOLOGY BRIEF

INSIDE THIS ISSUE:

WISPNOG	1
WiMAX != BWA	2
WiMaxxed?	2
700 MHz & IEEE	5
Competitive Testing	5
Technolog-E-Advice...	6

c w • l a b

- technology architects -

Special points of interest:

- Maxed out on WiMAX? Want to know more about WiMAX, but overwhelmed by the marketing hype? Read Part III of our WiMAX Update Series.
- Check out Wimaxxed online - the eXXclusive online news source for everything WiMAX. www.wimaxxed.com
- WiMAX Trends is the leading information gateway for WiMAX, based on the IEEE 802.16 standard for wireless MAN technology. www.wimaxtrends.com
- What's the best radio for the job? Trango? RedLine? Canopy? RadWin? Tranzeo? Mikrotik? Orthogon? Want to know the "hidden secrets" that salespeople "conveniently forget" to tell you about? Read real-world user reviews at www.wispreviews.com

WISPNOG != BRIDGED (A ROUTED EVENT) FEBRUARY 17-18, 2005

WISPNOG

WIRELESS INTERNET SERVICE PROVIDERS - NETWORK OPERATORS GROUP

- CHICAGO - FEBRUARY 17 - 18, 2005 -

As networks grow, a major decision facing operators on all levels is whether to continue bridging or to find an appropriate mix of integrating a routed architecture within their networks. For the start-up, bridged networks provide several benefits, including ease of installation and protocol transparency. However, such blissful ignorance is shown only to continue indefinitely in the smallest of networks.

By bridging, or simply gluing the network together, devices initially installed as "plug-and-play" in a small bridged network eventually evolve into "plug-and-pray" when troubleshooting is required in the context of a larger network.

Like our broadband wireless networks, the license-exempt broadband wireless industry has also experienced spectacular growth these past few years. Unfortunately, it seems that the industry hasn't had the foresight to "route" things out. The growing buzz around emerging wireless technologies has resulted in nothing more for industry events than what "community-wireless hippies" with Pringles cans and Best-Buy amplifiers have done to license-exempt spectrum; an all-around increase in the general noise floor.

Independent Operators have been using license-exempt wireless technology for over 10 years now, yet "technical" wireless symposiums are still filled with "experts" spending 95% of a session teaching us how to spell RF.

WISPNOG is a "routed" event; a high SNR symposium that cuts through the "noise-floor" surrounding us. WISPNOG is for experienced operators; our focused discussion forums bring experienced industry professionals together to discuss and exchange ideas and solutions. In addition, we provide a coupon book to ensure that you leave with SOLUTIONS IN HAND.

The WISPNOG Coupon Book, given to every registered attendee, offers over $10,000 in savings on BWA infrastructure solutions. The Coupon Book provides **IMMEDIATE ROI** for registered attendees by covering the cost of attending WISPNOG through Coupon Book Savings, and guarantees that every registered attendee leaves WISPNOG with a solution to save them money.

We hope WISPNOG provides you with enough information to create a flurry of ideas to carry home and share with you colleagues back in the office. With the generous support of our advisors, our distinguished faculty of panelists, our exhibitors, sponsors, media partners, and most importantly you, a member of the vibrant, unwavering WISP community, I believe that we have made WISPNOG the most timely and valuable symposium for Wireless Network Operators everywhere.

-Charles Wu

Operating Manager - CWLab

www.wispnog.com

Maxed out on WiMAX

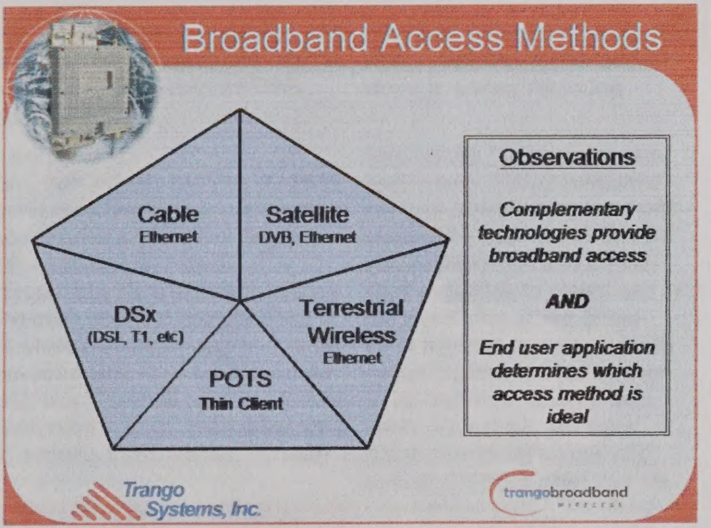
Part III: WiMAX != BWA?

A recent report released by the Yankee Group in October 2004 states that:

"WiMAX wireless broadband is gaining in popularity and is poised to become the third-most used high-speed internet access technology after DSL and cable modems..."

Although the WiMAX marketing machine has done a decent job of blurring the distinction between WiMAX and broadband wireless, in understanding the realities of WiMAX, it is VERY IMPORTANT to remember that WiMAX represents JUST ONE TYPE of terrestrial broadband wireless access technology. This point was strongly stated in the "WiMAX: Why Wait?" session at ISPCON Fall 2004 presented by Michael Cochrane of CTI, a provider of BWA infrastructure solutions. One of the panelists, Chuck Eapan of Trango Broadband, a manufacturer of proprietary (non WiFi or WiMAX) license-exempt BWA infrastructure solutions, illustrated these differences with the following slide.

(Opposite Page)



Broadband Access Methods

Observations

Complementary technologies provide broadband access

AND

End user application determines which access method is ideal

Today, WiFi is used (due to the world-wide adoption of the 802.11 standard) to generically describe wireless local area networking technologies. The WiMAX marketing machine is trying to impose WiMAX as the generic term for terrestrial broadband wireless access. HOWEVER, reality shows that terrestrial broadband wireless access technologies today consist of a combination of cellular, WiFi, and proprietary solutions. Today, WiMAX accounts for ZERO PERCENT of the technology behind today's classification of "Terrestrial BWA" as as an alternative method for Broadband Access. As of February 1, 2005, WiMAX equipment DOES NOT EXIST...it is PURELY HYPE.

On an interesting side note, although this document was originally written in November, 2004, it was recently announced last week that WiMAX certification testing would be delayed by a minimum of 6 more months. As a result, a certified "WiMAX kit" will not launch until the end of 2005.

Going back to the previous Yankee Group statement, if properly amended, should state:

"Broadband Wireless Access Technologies are gaining in popularity as an alternative access medium and are poised to become the third-most used high-speed internet accecss technology after DSL and cable modems...the WiMAX forum, a

(Opposite Page)

> "the WiMAX forum...represents ONE POSSIBLE solution towards overcoming some of the hurdles involved in choosing Terrestrial Wireless Technology as a method for delivering last-mile broadband."

CWLab Technolog-E-Advisors All WiMaxxed Out...

Starting this month, joining Roger May Stoj, Adlane Fellah from Maravedis Inc and Suzanne Yingling from WiMAXetc, CWLab Technolog-E-Advisors will begin providing editorial content for WiMaXXed.com - the eXXclusive online news source for everything WiMAX.

WiMaxxed

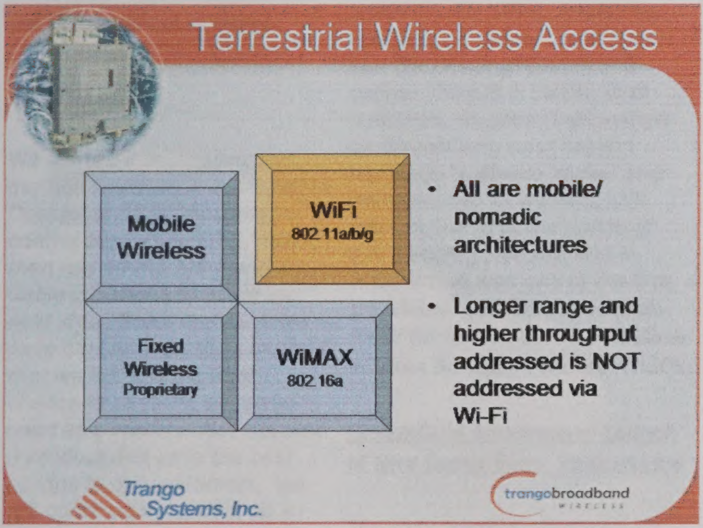
WiMaxxed.com brings you the latest on equipment, providers, manufacturers, markets, news stories and press about advancements in WiMAX and the emergence of the IEEE 802.16 broadband fixed wireless standard.

www.wimaxxed.com

MAXED OUT ON WIMAX
PART III: WIMAX != BWA?

(Previous Page)

consortium of equipment manufacturers and service providers within the Broadband Wireless Access space who are trying to solve some of the technological and economical problems faced by today's BWA technologies via a common IEEE standard, represent one potential solution towards overcoming some of the hurdles involved in choosing Terrestrial Wireless Technology as a method for delivering last-mile broadband.”



Terrestrial Wireless Access

Mobile Wireless

WiFi
802.11a/b/g

Fixed Wireless
Proprietary

WiMAX
802.16a

- All are mobile/ nomadic architectures
- Longer range and higher throughput addressed is NOT addressed via Wi-Fi

Trango Systems, Inc.

trangobroadband wireless

If there is anything that is important to remember, it is to note that WiMAX REPRESENTS JUST ONE PORTION of the various terrestrial BWA technologies available to the independent operator.

Today, the popularity of the WiFi standard resulting in its low costs have made it a very popular BWA technology platform for operators. However, this standard, originally engineered for indoor wireless LANs spanning several hundred feet, lacks many of the needed mechanisms required to address the many issues that a multi-mile outdoor BWA solution faces. 802.16a & WiMAX was created to provide one such solution to overcome “WiFi's shortcomings” in outdoor BWA deployments.

ONE IMPORTANT FACTOR TO NOTE in terms of the development and acceptance of WiMAX is the lower left hand box that reads “proprietary fixed wireless.” Since the early 90s, the shortcomings of wireless LAN technology in outdoor environments have been acknowledged and several proprietary solutions have already been developed to address these issues. An early such solution is the story of Doug Karl and KarlNet.

History of KarlNet.

In 1992, KarlNet founder and chief technology officer Doug Karl was on the computer science faculty at Ohio State University (OSU) in Columbus and managing the school's Internet-connected network. Doug had some remote facilities several miles out that he needed connected where, due to distance or right-of-way limitations, it wasn't cost effective to pull fiber. At the time, wireless LAN technology had just been introduced, and Doug used it in an early attempt to “bridge the last mile.” Realizing that wireless LAN technology wasn't robust enough to handle this task, Doug rewrote the protocol driver to create TurboCell.

To solve his “campus connectivity issues,” Doug combined his new TurboCell protocol with standard PC components, circuit board radios and off-the-shelf antennas to create one of the world's first fixed broadband wireless access systems. According to business partner Doug Harman, “That made a pretty big splash. We were doing something unique and selling at a price point that wa very hard to beat.” The fixed wireless systems very quickly became the company's lead products.

Then big competitors like Lucent - soon to be customers as it turned out - persuaded KarlNet to give up making complete systems and to sell its market-leading fixed wireless software as an OEM firmware offering. KarlNet put the software on a circuit board and sold it to companies like Lucent which then integrated it with their own radios and antennas to create the final product.

By the late 90s, an accidental technology based on emerging wireless 802.11 LAN standards, commonly known today as Wi-Fi, had emerged as the basis for an alternative last-mile delivery medium. Frustrated with lack of access into the cable infrastructure and unable to make the DLS business model work (as exhibited by the spectacular bankruptcies of CLECs like Rhythms and Northpoint), a few innovative operators (including the author here) realized that it was possible to “extend” the range of low-cost “indoor wireless LAN” equipment by adding amplifiers and antennas. Take a 1-2 Mb wireless LAN device,

(Next Page)

> “Remember, WiMAX represents ONE PORTION (that incidentally doesn't yet exist) of the various terrestrial BWA technologies available to the independent operator.”

MAXED OUT ON WIMAX

PART III: WIMAX != BWA?

(Previous Page)

add a couple thousand dollars for accessories and a high point (tower or building rooftop), and you now have (a) created a cost-effective method of delivering last-mile broadband access to your customers (NOTE: it was 1997/1998, and at this point, the SMB/SOHO T1 replacement market was the main target) and (b) by "owning" your infrastructure, you have become facilities based and "freed" yourself from the Incumbent Telephone Company. An illustrative example of such an "innovator" was Midcoast Internet Solutions out of Maine.

The MIS Story

We started investigating this method [wireless broadband] in December 1997 as a way to control our own destiny, rather than rely on the Telco and/or Cable industries to make the next step. Since that time we have chosen a wireless method that we felt had the best chance of allowing us to succeed as a wireless ISP, but also a product that gave the best service to our customers. We will continue to operate as a dial-up ISP and are working to provide DSL services in some of our areas.

In the fall of 1998, MIS activated a 130' tower in Owls Head, Maine in the first step of our wireless network. Today (2000) MIS operates a wireless access system from 8 distribution points with many more on the way. Our recent acquisition of a 300' tower in Westport, Maine, will anchor the southern territory of the MIS wireless network. We are thrilled to be able to bring affordable, high quality, high-speed access to the mid-coast of Maine.

Historically, the license-exempt Part-15 bands were dubbed "junk" bands because of the plethora of devices and manufacturing equipment occupying them - devices and equipment not used for communications purposes, but occupying spectrum only because RF energy was a byproduct of their operations. In the early days, innovators like Doug Karl were forced to "jerry-rig" solutions pieced together from off-the-shelf PC & wireless LAN components. In time, however, there were enough such operators to convince startup wireless LAN manufacturers, like Alvarion, that this "accidental market" actually had potential. By 1999, amidst the spectacular telecom meltdown and the ensuing failures of licensed (MMDS & LMDS) BWA operators, Alvarion (then known as BreezeCom) went beyond KarlNet's "software hacks" and reengineered its wireless LAN product line to fit the needs of this fledgling industry, and in 2000 introduced one of the first proprietary products build exclusively for license-exempt Wireless Internet Service Providers (WISPs)

BreezeCOM Announcecd Launch of New Carrier-Class Product Line

TEL AVIV, Isreal/CARLSBAD, CA, November 6, 2000—BreezeCOM (NASDAQ: BRZE), a leader in the design and manufacture of high-speed wireless access solutions, today announced the launch of BreezeACCESS II™, a new carrier-class line of wireless access products. Designed for operation in the 2.4 GHz ISM band, BreezeACCESS II™ brings a new level of system reliability, network manageability and easy of installation previously only available to licensed carriers. Now, service providers operating wireless networks in the 2.4 GHz license-free band can leverage the same technologies developed by BreezeCOM for carriers in the 2.5 MMDS and 3.5 GHz licensed frequencies.

Over the years, as this accidental industry matured, more independent operators, frustrated with last-mile access, turned to license-exempt BWA either to retain their existing dial-up customer base or as a means to compete against incumbent cable, DSL and leased line providers. And such a "disruptive technology" flourished. In 2002, amidst the "telecom meltdown," Research Firm In-Stadt MDR estimated that in North America alone, there were over 1,500 independent WISPs with aggregate annual BWA access revenues of approximately $250 million.

Spectrum that was formerly the exclusive province of microwave ovens and industrial equipment today plays host to wireless broadband networks that not only provide last-mile connectivity, but last 30-50 mile connectivity. There are license-exempt BWA networks spanning hundreds of miles and covering several states, servicing rural and remote communities that have no broadband options. Today, innovative operators like MIS, who pioneered the license-exempt broadband wireless access market in the late 90s, number in the thousands, as the 2004 North American License-Exempt BWA Point-to-Multipoint Access Hardware Infrastructure have exceeded $100 million (Sky Light Research) and aggregate North American annual BWA access revenues in 2005 are projected to exceed $1 billion (Jupiter Research).

Next Month

So what does WiMAX have to do with all this?

www.cwlab.com/wimax

> "Spectrum that was formerly the exclusive province of microwave ovens and industry equipment today plays host to wireless broadband networks that not only provide last-mile connectivity, but last 30-50 mile connectivity..."

THE HOLY GRAIL OF 700 MHZ? AN OVERVIEW OF 802.22

Over-the-air broadband TV channels are separated by unused frequencies. This "white space" in the broadcast spectrum varies with the channels present in a locale and creates opportunities for other applications. As a step in putting these unused channels to practical use, the IEEE has started work on a standard to enable the deployment of wireless regional area networks using the unused TV channels, while not interfering with the licensed services now operating in the TV bands.

IEEE P802.22™, "Standard for Wireless Regional Area Networks (WRAN) - Specific requirements-Part 22: Cognitive Wireless RAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications: Policies and procedures for operation in the TV Bands," will specify a cognitive air interface for fixed, point-to-multipoint, wireless regional area networks that operate on unused channels in the VHF/UHF TV bands between 54 and 862 MHz.

"Signals at these frequencies can propagate 40 km or more from a well-sited base station, depending on terrain," says Carl R. Stevenson, Interim Chair of the IEEE P802.22 Working Group. "This is ideal spectrum for deploying regional networks to provide broadband service in sparsely populated areas, where vacant channels are available. Our goal is to equal or exceed the quality of DSL or cable modem services and to be able to provide that service in areas where wire line service is economically infeasible, due to the distance between potential users.

"This standard will enable the creation of interoperable IEEE 802 WRAN products. It has generated a great deal of interest from wireless internet service providers, community networking organizations, government bodies and other parties."

Protocols in the standard will ensure that this new service does not cause harmful interference to the licensed incumbent services in the TV broadcast bands. The standard will provide for broadband systems that choose portions of the spectrum by sensing what frequencies are unoccupied.

www.cwlab.com/wiTV

the IEEE has started work on a standard to enable the deployment of wireless regional area networks using the unused TV channels (700 MHz)...

CWLAB "BACKHAUL BASH" SCHEDULED FOR BBW WORLD 2005 IN VEGAS

CWLab, the Broadband Wireles industry's real-world consumer reporting and independent equipment testing organization, will present an exclusive afternoon Pre-WiMAX Equipment Review Workshop at the Broadband Wireless World Conference this April 2005 in Las Vegas, NV.

This four-hour workshop will provide an independent 3rd party comparative review, based upon REAL-World implementation and field testing, on the capabilities of various high-capacity broadband wireless backhaul and bridging solutions available on the market today. Presentation material will cut through marketing "feature speak" by giving participants an in-depth "nuts-and-bolts" view of "the good, bad & ugly."

Each radio solution presented will undergo the following implementation scenarios and comparative testing criteria:

1. Field Implementation Scenarios
    - 50 foot "controlled" Lab Setup (for best-case benchmarking purposes)
    - 4 mile Line-of-Sight Real-World Setup
    - 20 mile Line-of-Sight Real-World Setup
    - 2 mile Non Line-of-Sight Real-World Setup (if applicable)
2. Comparative Testing Criteria
    - CWLab Throughput Certification Score #201
    - Basic Throughput Test #101
    - Basic Latency Test #202
    - QoS Support Test #203

5th Annual Broadband Wireless WORLD 2004

Registered attendees will receive a complementary copy of CWLab's "WiMAX-What Now?" Analysis Paper ($995 value) and the WISPNOG Coupon Book.

www.cwlab.com/Certification/

cw•lab
technology architects

50 East 26th Street, Suite 404
Chicago, IL 60616

Contributing Editors:

Phone: 773-326-4614
Fax: 773-632-0571
Email: cwu@cwlab.com

Have you read up on...

WiMAX Trends

A Leading portal for WiMAX
www.wimaxtrends.com

Upcoming Events

WISP•NOG
- Chicago - February 17-18 2005 -

February 17-18, 2005
http://www.wispnog.com

Broadband Wireless World

April 21-22, 2005
http://www.shorecliffcommunications.com/bww05/

ISPCON

May 24-26, 2005
http://www.ispcon.com

-----Original Message-----
From: Trango-owner_at_part-15.org
Sent: Friday, December 31, 2004 3:56 PM

Okay UPS just hand delivered a 2 page letter describing the NEW Verizon Fiber now available in my neighborhood..

Starting out at 5 megs down and 2 megs up for $39.95! 15 megs 2 meg down at $49.95

My question to you is HOW do I compete with only 3-6 megs available to me (other 3 megs have not been provisioned yet so I only have 3 so far) I am calling now to see if I can resell this service and then NAT some IPs to clients and see if I can do that???

-----End Message-----

More Upstream and bigger wireless pipes are not going to solve these issues, as wireline technologies have an inherent economic and technical advantage over wireless (hence why in the late 90s, large carriers replaced their x-country microwave backbones w/ fiber).

It is necessary to remember that as independent license exempt operators, we are all "Davids" vs. the incumbent cable ops, ILECs, etc - the "Goliaths" of Telecom. Now, if we try to match "Goliath" w/ sheer brawn (in this case, competing head to head on bandwidth and price) - it's only a matter of time before we lose due to "Goliath's" greater strength (in this case, manpower, money, resources, government support, etc).

As the "underdog" - what is necessary is that we utilize our inherent speed and flexibility to our advantage. How is this done? Well, for starters, rather than competing on their terms, we should work on "rephrasing the problem" and fighting them on our terms...

For an analogy, just take a look at one of history's most effective generals - Alexander the Great. What's notable is the fact that when going up against the Persian Empire, Alexander was the underdog (imagine, his 30,000 man army defeating a million plus man Persian army). How did he win? By redefining the battlefield and fighting the Persians on HIS TERMS.

Case in point, early in his campaign, before he could invade into the heart of Persia, he faced the problem of the Persian Navy. Facing hundreds (if not thousands) of ships piloted by seasoned mariners who had the ability to cut off his supply lines, he at the time had no navy, and his army had never fought a naval battle. So, did Alexander try "fight the Persians on their terms" by building, equipping and training a navy? No, he instead focused on winning control of all the sources of fresh water along the Mediterranean coastline, and by redefining the playing field, he conquered the Persian navy without a single naval battle.

Today, as independent wireless operators, in order to survive and flourish, it is necessary to think along these same terms. License Exempt Fixed Wireless has definite advantages; flexibility, ease of install, potentially nomadic capabilities, etc - in addition, we as independent operators also have similar type advantages and should be exploring value-added services - like personalized, local & better service, the ability to adopt the latest technologies, break-fix internal networking services...

So, what to do? Rather than butting your head against the wall while trying to compete against incumbents on their terms, let's focus on using our innovative and independent spirit to redefine the playing field with new ideas (underserved areas, mobility, roaming, VoIP, retirement communities, etc) so we can **WIN ON OUR TERMS**.

CWLab

TECHNOLOGY BRIEF

Volume 2, Issue 1

January 2005

INSIDE THIS ISSUE:

WISPNOG Update 1
Coupon Book Program 1
What is WiMAX? 2
Wireless-Tech-Gurus 2
700 MHz WRANs 3
Technolog-E-Advice... 4

Special points of interest:

- Maxed out on WiMAX? Want to know more about WiMAX, but overwhelmed by the marketing hype? Read Part II of our WiMAX Update Series.
- Check out Wireless Tech Radio live - Wednesday mornings online at 9am CST to learn the latest on wireless equipment, technologies, providers, manufacturers, markets, as well as the 'best practices' of operators and organizations in the forefront of the industry
- What's the best radio for the job? Trango? RedLine? Canopy? RadWin? Tranzeo? Mikrotik? Orthogon? Want to know the "hidden secrets" that salespeople "conveniently forget" to tell you about? Read real-world user reviews at www.wispreviews.com

WISPNOG CHICAGO UPDATE FCC COMING TO TOWN...

The WISPNOG Organizational Committee has been working hard these past few days to finalize the venue, association partnerships and speakers.

Recently, the FCC has expressed an interest in attending WISPNOG. However, they would like to know beforehand what discussion topics to prepare for, so they can be sure to send the correct person.

So, we asked around, and this is the feedback we have received so far:

<opinion 1>

Something more along the line of ideas for new frequencies that allow the smaller broadband wireless operators to compete with the deep pocketed telcos.

<opinion 2>

What about mandates? Tariffs? Are there any in the works? Especially concerning VoIP and VOWLAN.

<opinion 3>

I would like to know whether the few UHF TV channels that are grabbed back will be allocated to ISM wireless data.

<opinion 4>

I would like the FCC to send an enforcement person and someone who works with certification. We need to be able to understand what the FCC will and won't permit and be able to grill them with questions: I.E. "what should I expect if the FCC knocks at my door?" "If my setup matches a certificated set of equipment but I bought it from multiple sources is it still certified?"

Please visit the WISPNOG web site to register your thoughts...

www.wispnog.com

WISPNOG COUPON BOOK PROGRAM GUARANTEED RETURN-ON-INVESTMENT

The WISPNOG Coupon Book provides thousands of dollars of savings on everyday deployed BWA infrastructure solutions. A part of the official WISPNOG show guide, this program provides IMMEDIATE ROI to every registered attendee by providing savings that will more than pay the cost of attending WISPNOG through discounts from popular BWA vendors on network infrastructure purchases.

WISPNOG understands that operators today need quantifiable results for actions taken; the WISPNOG Coupon Book ensures that in the event that the educational discussion forums flop, every registered attendee will still walk away with some method of saving money in their network.

www.wispnog.com/coupon.htm

MAXED OUT ON WIMAX PART II: WHAT IS WIMAX?

As stated in our previous issue, the WiMAX marketing machine has caught the press by storm, leading to story after story about the wonders of WiMAX. However, the buzz created around WiMAX has resulted in a certain degree of misinformation and misunderstanding that needs to be clarified and corrected. For example, although there is nothing in common between the WiFi and WiMAX standards (and we will outline in a future issue how WiFi could become one of the chief competitors of WiMAX), even reputable industry publications like Business Week have mislabeled WiMAX, terming it "Wi-Fi on steroids." The Washington Post, in reporting on WiFi and WiMAX technology, has stated that "the technology [WiFi] will grow more powerful, too, as a type known as WiMAX that sends signals up to 30 miles hits the field." to the casual observer, one would probably believe that WiMAX "upgrades" WiFi, and with the enormous success of Wi-Fi, the evolution into WiMAX is a slam dunk.

WiMAX—What, When, Where, Who and Most Important Why?

Let's get right down to the specifics. There are two distinct standards the WiMAX Forum is putting together. The first standard, 802.16a revision d, is finished. With all the amendments and changes that were included the standard has been renamed to 802.16-2004. 802.16-2004, by specifying a metropolitan area networking protocol that supports low latency applications such as voice and video, provides Non Line-of-Sight (NLoS) broadband connectivity that will enable a wireless alternative for cable, DSL and T1 level service for last mile broadband access. 802.16-2004 is designed for systems operating in bands between 2 GHz and 11 GHz, frequencies with the ability to support NLoS. Although multiple PHY-layers have been specified in 802.16-2004, the WiMAX Forum has determined that the initial certifications will support the 256 point FFT OFDM PHY.

The OFDM signaling format was selected due to its ability to support NLoS performance while maintaining a high level of spectral efficiency maximizing the use of available spectrum. In addition, other PHY layer features of 802.16-2004 that are instrumental in giving WiMAX the power to deliver robust performance in a broad range of channel environments include flexible channel widths, adaptive burst profiles, forward error correction with concatenated Reed-Solomon and convolutional encoding, optional AAS (advanced antenna systems) to improve range/capacity, DFS (dynamic frequency selection) - which helps in minimizing interference, and STC (space-time coding) to enhance performance in fading environments through spatial diversity.

WiMAX systems control access to the "shared wireless medium" by utilizing a slotted TDMA protocol scheduled by the BTS to allocate capacity to subscribers in a point-to-multipoint network technology. In addition, beyond just mere prioritization, the MAC layer in WiMAX has also been designed to address the harsh physical layer environment where interference, fast fading and other phenomena are prevalent in outdoor operation.

At this time, the WiMAX forum is expecting to see the first round of certification happen sometime in the second quarter of 2005 but this date could be pushed off further. Reality is that the WiMAX Forum has nearly doubled the amount of specific tests that will be required in order to pass certification. Currently, there are more than 900 individual tests that will need to be performed on

(Opposite Page)

"the WiMAX forum is expecting to see the first round of certification happen sometime in the second quarter of 2005 but this date could be pushed off further...with more than 900 individual tests to be performed on each manufacturer's equipment."

CWLAB TECHNOLOG-E-ADVISORS APPEARING AS WIRELESS-TECH-GURUS

Starting this January, joining Jim Sutton, Marlon Schafer, Steve Stroh and guests from throughout the wireless world, CWLab Technolog-E-Advisors will now be hosting a 15 minute bimtonhly "Wireless-Tech-Guru" segment on Wireless Tech Radio. Wireless Tech Radio is dedicated to the subject of wireless equipment, technologies, providers, manufacturers, markets, as well as the 'best-practices' of operators and organizations in the forefront of the wireless industry.

The initial Wireless-Tech-Guru sessions, scheduled to air on January 12 and 26th, will focus on 700 MHz and IEEE 802.22.

WirelessTechRadio

Wireless Tech Radio is broadcast Wednesday mornings online at 10:00 am EST and 7:00 am PST.

www.wirelesstechradio.com

MAXED OUT ON WIMAX PART II: WHAT IS WIMAX?

each manufacturer's equipment.

One thing that appears universal across every manufacturer we talked to is the availability of "Pre-certified" WiMAX equipment to the public sometime in the first quarter of 2005. RedLine Communications and Alvarion already have plans to release equipment within the next few months that could be considered WiMAX compliant but will not be able to carry the WiMAX logo. Remember, this equipment is only for the non-US market as it is currently tuned to the 3.5 GHz band. When will we see gear that is made to be used in the US? The truth of the matter is that nobody is saying. About the best information I could get was that there "may" be a US version of WiMAX available for use in the 5 GHz band sometime next year.

The second standard has been dubbed 802.16e and it specifically deals with mobility. As to the date we will see certification testing begin for this standard, the best guess is sometime in late 2007. At this time the mobility standard is still being defined. I had a very interesting conversation with Jim Orr (Principle Wireless Network Architect at Fujitsu) about where he thinks this standard will take us. From my perspective, I don't see the average consumer paying extra for a WiMAX equipped notebook but Jim feels differently.

At this time, there are only two frequencies that the WiMAX Forum is specifying, 3.5 GHz and 5 GHz. There was quite a bit of interest in where the standard might head for other frequencies. There is certainly some interest in the 2.3 & 2.5 GHz Licensed band but there seems to be no great demand for WiMAX to enter either the 700, 900 MHz and/or 2.5 GHz band.

What does WiMAX mean to the Independent Operator?

What will WiMAX do for you? Well, as we all know that is dependent on a number of variables. If you are deploying in a metropolitan area devoid of foliage, WiMAX will certainly outshine just about anything out there for hardware right now. Built specifically to solve all the issues of first generation Wireless WAN deployments with hoped-for sub-$100 CPE price point, WiMAX seems to be the magic bullet that we are all asking for.

At the November 2004 ISPCON show, I moderated and was involved with several speaking panels that dealt with WiMAX. A statement that especially caught my attention about WiMAX was made by Jeff Or, Manager of Marketing & Business Development for Proxim Cororation. It is summed up as: "WiMAX 802.16-2004, was created for you [WISPs & independent operators] to address your needs [do everything that WiFi cannot] in bridging the last-mile. Initially, you guys will be our market, utilizing WiMAX technologies to replace expensive leased line backhauls; as volumes increase and later standards are ratified, mass market adopters will accept WiMAX, and we will soon see it everywhere…" I don't know about you, but with Canopy and Trango solutions in the $200-300 range today getting the job done fine, I can't imagine going back to buying $1,500+ CPEs in order to become a stepping stone for some large carrier…

However, this statement made me immediately think of one of the most common misconceptions I hear today about WiMAX. Contrary to widespread belief, WiMAX is NOT the ONLY substitute for BWA. Although they are closely related, they are COMPLETELY SEPARATE TOPICS OF DISCUSSION…

www.cwlab.com/wimax/

> I don't know about you, but with Canopy and Trango solutions in the $200-300 range today getting the job done fine, I can't imagine going back to buying $1,500+ CPEs in order to become a stepping stone for some large carrier…

IEEE 802.22: WRANS & 700 MHZ NLOS NO NEED FOR WIMAX?

As the "Wait for WiMAX" drags on, an increasing interest in NLoS technologies and new FCC spectrum policies regarding the UHF channels (NPRM 04-186) have created the new IEEE 802.22 WRAN working group and some interesting controversy and discussion.

The IEEE 802.22 Standard has been created to tap open regions in the TV spectrum for wireless broadband services. This "white space" in the broadcast spectrum varies with the chanels present in a locale and creates opportunities for other applications. The 802.22 standard will enable the deployment of 20+ miles NLoS Wireless Regional Area Networks using the unused TV channels while not interfering with existing licensed services.

In the upcoming months, the CWLab Technology Brief will monitor and discuss the developments of this IEEE standard, comparing the pros and cons of this emerging technology against WiMAX; continuing our analysis of the necessary steps Independent Operators should take in today's "pre-WiMAX" world.

www.cwlab.com/802-22/

cw·lab
- technology architects -

50 East 26th Street, Suite 404
Chicago, IL 60616

Contributing Editors:
Ken DiPietro
Pete Davis

Phone: 773-326-4614
Fax: 773-632-0571
Email: cwu@cwlab.com

Have you listened to...

WirelessTechRadio

Wednesday 10 AM EST Online
www.wirelesstechradio.com

Upcoming Events

WCA's
International Symposium
& Business Expo

Jan 12-14
2005
San Jose, CA

January 12-14 2005
www.wcai.com/event/05/ts11gen.htm

NANOG

January 30-February 1 2005
http://www.nanog.org

WISP·NOG
- Chicago - February 17 - 18 2005 -

February 17-18 2005
http://www.wispnog.org

More Good Enough Network Debate…

It's the start of a New Year, and License Exempt Wireless Broadband is finally starting to gain a foothold within the mass market (unfortunately mislabeled as WiMAX), but hey, all news is good news, right? However, before "shooting off into the horizon," it's necessary to take a quick breath in order to refrain from getting caught up in the "hype" of technology; lets get back to basics and focus on the fundamentals of the "WISP game."

Most WISPs operate towns with populations <10,000. Grocery stores in these towns do not carry sushi, cavier, escargot or other similar type foods. Car dealerships don't sell Ferrari's, BMWs or Mercedes. Apartments sit in the $250/month range - nothing very luxurious.

On the contrary, in Chicago, IL, there are dozens of grocery stores importing food from everywhere under the sun. Cars from any corner of the world can be found, and apartment parking spaces alone exceed $250 / month.

In the majority of these small rural towns, smart business sense precludes the existence of gourmet grocers, exotic car dealerships , and luxury apartments.

In building your network, remember to access the market economics and stay true to the laws of supply and demand - if the town only has 10,000 people, don't, for the sake of winning a science fair award (or for bragging rights at the upcoming WISPNOG show), build a 10,000 user wireless network with multiple redundant OC12 feeds when competition sets the market rate for broadband at $29.95 and the realistic penetration rate of your WISP sits at about 300 accounts.

When competing with DSL and cable modem service, remember that data access is a commodity market. Also remember that those "enhanced value-add" services that vendors like to use to talk up the features and price of their products, are also commodity services. Remember, your customer is mostly agnostic to the method he receives his bits, and all commodity things ultimately boil down to price.

In this time of tumultuous technological change, does this mean adopting a "wait and see" position? That's like asking whether the dialup operator was foolish to build out a NOC and mail/web services in 1988. To many, it would seem stupid to invest in infrastructure and then immediately have to upgrade one's network from 1200 to 2400 to 9600 baud; to 14.4 and 28.8 and 33.6 and 56k and v.90 and so on…However, at the end, the ones who took the "plunge" and built up customer base got the last laugh, as they were able to sell to big-time operators like AOL, MSN, Earthlink, Verio for a nice profit.

So, what's the time-proven formula for success? Perhaps the answer lies in building "good enough" networking – I know it's chicken of me to say this, but sometimes, it's not necessarily bad to be the SECOND guy to adopt new technology. Remember, the early bird does get the worm, but the second rat (to the trap) gets the cheese.